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of the æsthetic attitude together with the several values of those objects which stand in an æsthetic relation to it. Thus an æsthetic object gives rise to two feelings, an æsthetic and a value feeling. One is the pleasure derived from viewing beautiful objects, the other that feeling of satisfaction in the thought of the beautiful object's existence. The object has a value since it arouses our æsthetic pleasure. Æsthetic pleasure is, indeed, itself an object of value. The origin and essence of art rest on these facts. The æsthetic enjoyment is an object of value, and so, therefore, are all those objects which mediate it. Both are ends of desire and, therefore, motives for willing.

The worth of Witasek's æsthetics rests on its usefulness. To prove this, it must first be tried. We shall not all accept his premises in their present arbitrary form ; for it seems as if he missed much which may yet be got from introspective analysis. Nevertheless, his service is not to be underrated for supplying us so complete, so logical, and so apparently workable an hypothesis.

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*Contributions to the Study of the Behavior of Lower Organisms.* By HERBERT S. JENNINGS. Published by the Carnegie Institution of Washington, 1904. — pp. 256.

In part, this volume is a continuation of a series of papers by the author on the reactions of lower organisms to stimuli. But it is also, in part, an attempt to sum up the results of his previous work, and to interpret these results with reference to the theory of tropisms and to animal behavior at large. The first three papers, "Reactions to Heat and Cold in the Ciliate Infusoria," "Reactions to Light in Ciliates and Flagellates," and "Reactions to Stimuli in Certain Rotifera," and the fifth and sixth papers, "Physiological States as Determining Factors in the Behavior of Lower Organisms," "Movements and Reactions of Amœba," may be considered as falling under the first head ; the fourth and seventh papers, "The Theory of Tropisms," "The Method of Trial and Error in the Behavior of Lower Organisms," under the second. Jennings's treatment of the theory of tropisms consists in trying to fit his own observations of the behavior of the lowest organisms to the tropism schema as outlined by Verworn and Loeb. There are two essential features of the tropism theory. "(1) The movements of organisms toward certain regions and their avoidance of others are due to *orientation ; i. e.*, to a certain position which the organism is forced by the external stimulus to take, and which leads the organism toward (or away from) the source of the stimulus, without any will or desire of the organism, if we may so express it, to approach or avoid this region. (2) The external agent by which the movement is controlled produces its characteristic effect directly on that part of the body upon which it impinges. It thus brings about direct changes in the state of contraction of the motor organs of that part of the body affected as compared with the remainder of the body, and to these direct changes are due the changes shown in the movements of the organism" (p. 92). Jennings's observations tell against both of these theses. Orientation is "not a primary nor a striking factor" in the reactions of organisms. "The response in all these cases is provided through a 'motor reaction,' consisting usually of a movement backward, followed by a turning toward a structurally defined side. The direction of turning is thus determined by internal factors" (p. 107). This description of the manner in which organisms react to stimuli is important, and, if true, is fatal to the second thesis of the tropism theory. Suppose that a negatively tropic organism lies at right angles to the direction of the stimulus, so that the motor organs on one side only are stimulated. According to the tropism theory of Verworn and Loeb, the organism should turn from the stimulus and swim away. Jennings finds that an organism, under the conditions assumed, may turn directly toward the stimulus, provided that a certain part of the body (the aboral side) faces the stimulus. In place of the theory of tropisms, Jennings proposes the method of trial and error. "This [method of trial and error] is the general plan of behavior among the lowest organisms under the action of the stimuli which pour upon them from the surroundings. On receiving a stimulus that induces a motor reaction, they try going ahead in various directions. When the direction followed leads to a new stimulus, they try another till one is found which does not lead to effective stimulation" (p. 237). The question what 'error' means for microörganisms is considered. "Why does the organism react to some things by turning away and trying new directions, to others not? Why do they react thus on coming to certain chemicals and on leaving others? . . . What decides whether a certain condition is 'error' or not? . . . There is no common thread running through all the different agents which constitute 'error' in the reactions, save this one, that they *are* error from the standpoint of the general interests of the organism" (p. 247). By what means can these organisms distinguish the beneficial from the injurious? Jennings holds that the criterion for the lowest organisms must be the same as that for the highest organisms. If we say that in man a subjective state, pain, is the cause of the avoidance of injurious stimuli, we must say the same thing for the lowest organisms. "Anyone who holds that we can account fully for the reactions of Euglena or Paramecium, purely from the physico-chemical conditions, without taking into account any states of consciousness, must logically hold that we can do the same in man" (p. 248). According to Jennings, therefore, the problem of the relation of mental and physical processes must be attacked at the lowest level of living things as well as at the highest.

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